Civil and Environmental Engineering 111
ENVIRONMENTAL ENGINEERING
Fall Semester 2017
3 units

Instructor:
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GSI office hours: M 2-4; Tu 9-11, 12:30-2:30; W 9-11

Lectures:
MWF 11-12 in 159 Mulford Hall

Discussion:
M 12-1 in 534 Davis Hall
M 4-5 in 534 Davis Hall

Course description
CE 111 systematically addresses water quality, air quality and their engineering control. We explore the characteristics of water, air, and pollutants. We study transformation and transport processes that affect pollutant levels in water and air. Reactor models to analyze the effects of processes on contaminant concentrations are developed. These scientific ideas and engineering analysis tools are applied to study the principles and practice of water and wastewater treatment technologies. We also investigate major air pollution problems and their control.

Student preparation
Solid preparation is one year each of college-level physics (Phys 7AB) and chemistry (Chem 1AB), math through a first course in differential equations (Math 54). First courses in environmental science/engineering principles (e.g., CE 11) and fluid mechanics (CE 100) are useful, but not required.

Main course topics (text chapter; approximate number of periods among 38 total lectures):
- Properties of air, water, pollutants (Ch 1-2; 3)
- Transformation processes (Ch 3; 8)
- Transport processes (Ch 4; 5)
- Reactor models (Ch 5; 3)
- Water quality engineering (Ch 6; 12)
- Air quality engineering (Ch 7; 7)

Assignment due dates and exam dates
- PS #1-#4: 8/30, 9/6, 9/13, 9/20
- MT #1: W 27 September
- PS #5-#8: 10/4, 10/11, 10/18, 10/25
- MT #2: W 1 November
- PS #9-#11: 11/8, 11/17 (F), 11/29
- Final exam: Tuesday, 12 Dec, 7-10 PM

Text:
WW Nazaroff and L Alvarez-Cohen, *Environmental Engineering Science*, Wiley, 2001.
We will cover material from Chapters 1-4, 5.A, 6, 7.A-C, and Appendices C and D. The lectures will complement rather than duplicate what is covered in the text. It is important to do the assigned reading *and* to attend lecture.

bCourses:
Important course information will be distributed and posted using bCourses. It is important that you receive and read e-mail messages concerning the course. Also, to lessen the environmental footprint of the course, some supplementary course materials will only be posted on bCourses and not distributed in hard copy.

Grading:
There will be 11 problem sets during the semester, two in-class midterm examinations, and a final examination. Final grade weighting: PS — 25%; MT exams — 30%; Final exam — 45%. Each student's PS score will be based on the 10 highest PS scores during the semester; the lowest score will be discarded.

Grades are not negotiable! The grade assigned in this course reflects Professor Nazaroff's subjective assessment of each student's performance, based on objective data from problem sets and exams. "Excellent" performance is necessary to earn an "A". Typically, this will require that all problem assignments are submitted and show high quality work. The exams must demonstrate thorough mastery of the concepts presented in this course and an ability to apply the concepts insightfully and accurately in engineering analysis.

The following table provides a summary of grade results from recent offerings of CE 111. There is some variation from term to term because of differences in the difficulty of exams, etc. So, this information is only indicative of expectations for grading this semester.

	Sp 2010	**F 2010**	**F 2013**	**F 2015**	**Cumulative**
No. students (No. UGs)	59 (55)	70 (64)	100 (94)	102 (87)	331 (300)
No. earning A's (UG A's)	12 (11)	19 (16)	31 (31)	46 (36)	108 (94)
Assignment score, average	94%	93%	97%	95%	95%
Midterm score, average	84%	87%	85%	92%	88%
Final exam score, average	82%	83%	84%	87%	85%
Course score, average	**85**	**87**	**88**	**90**	**88**
No. earning B's (UG B's)	35 (32)	38 (35)	55 (49)	39 (35)	167 (151)
Assignment score, average	87%	87%	92%	90%	89%
Midterm score, average	75%	78%	71%	74%	74%
Final exam score, average	63%	63%	63%	68%	64%
Course score, average	**73**	**74**	**72**	**75**	**73**
No. earning C's (UG C's)	11 (11)	11 (11)	12 (12)	12 (12)	46 (46)
Assignment score, average	79%	80%	76%	75%	77%
Midterm score, average	59%	61%	60%	61%	60%
Final exam score, average	43%	44%	45%	46%	45%
Course score, average	**57**	**58**	**57**	**57**	**57**

Problem Assignments:

1. Assignments generally are distributed in class on W (or F) and will be due at 4 PM the following W (or F). Assignments may be submitted in class on the due date, or to the locked CE 111 drop-box in O'Brien Hall, immediately outside Room 212.
2. **Late work is not accepted.**
3. Regarding collaboration: The work you submit is to be your own. If, after making an attempt at solving a problem, you are stuck, you may consult with the instructor or GSIs. You may also talk over the problem with other students in the class. But you **may not** examine the written work of any other student or solutions from previous semesters. This rule reflects the situation you will most likely face in professional practice: there will be experts with whom you can consult on tough problems, but ultimately, you will be expected to make independent contributions to their solution.
4. The problem sets in this class are to give you practice in (a) solving problems in environmental engineering, and (b) communicating results. The following approach is recommended:
   - Restate the problem objective — many errors arise from not understanding what a problem asks.
   - Identify the physical setting of the problem
     - If appropriate, draw a system figure, label the dimensions, axes, and list other important parameters. If a sketch is not appropriate, give a brief statement of the physical setting.
     - Differentiate among the information that is given by the problem statement, information that you obtain from other sources, and your assumptions.
   - Solve the problem, showing all assumptions, without skipping steps, and including a brief running commentary. Circle all answers and call attention to important intermediate results. Be mindful of the appropriate use of precision in expressing your answers (see handout on accuracy and precision).
   - Discuss briefly the significance of the results.

   You are responsible for the clarity of your work. If the grader cannot follow what you have done, then you may not receive full credit even if the work is correct.
5. To minimize the risk of reader burnout, please (a) express your answer in the units requested, and (b) box, circle, or otherwise clearly identify your answer. **Neatness counts** (not only in school but also in the real world)! The reader is authorized to deduct points for work that is sloppy or otherwise difficult to follow.
6. Each problem will be scored on a 4-point scale, as follows:
   4 points — problem done accurately and work presented clearly
   3 points — conceptually okay; minor error(s) in analysis and/or work difficult to follow
   2 points — major errors in approach or analysis
   < 2 points — substantially incomplete; not a serious effort
7. Solutions to the problem assignments will be posted on bCourses. It is valuable to study the solutions even if you have earned high scores.